

Message Text

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PAGE 01 MOSCOW 12619 01 OF 03 051123Z
ACTION EUR-12

INFO OCT-01 ISO-00 SOE-02 AID-05 CEA-01 CIAE-00
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R 051104Z JUN 78
FM AMEMBASSY MOSCOW
TO SECSTATE WASHDC 2558
USDOE WASHDC
USDOE GERMANTOWN MD

UNCLAS SECTION 01 OF 03 MOSCOW 12619

USDOE FOR BILLY HILL

E.O. 11652: N/A
TAGS: ENRG, TECH, TGEN, UR, US
SUBJECT: US-USSR ENERGY AGREEMENT: SUPERCONDUCTING
TRANSMISSION (08.0207)

REF: (A) MOSCOW 7647, (B) STATE 59783

1. KRZHIZHANOVSKIY POWER ENGINEERING INSTITUTE PROVIDED
EMBASSY MAY 31 WITH LETTERS FOR TRANSMISSION
TO DR. HUGH LONG, OAK RIDGE NATIONAL LABORATORY, AND
DR. M. C. JONES, INSTITUTE FOR BASIC STANDARDS ON
SUBJECT ACTIVITY. LETTERS BEING POUCHED UNDER REGISTRY
1911745. INFORMAL TRANSLATION FOLLOWS.

2. DEAR DR. LONG:

I WOULD FIRST LIKE TO THANK YOU AND ASSOCIATES OF THE
BROOKHAVEN NATIONAL LABORATORY AND LOS ALAMOS SCIENTIFIC
LABORATORY FOR THE FINE RECEPTION OF THE THREE SOVIET
EXPERTS AND THE INTERESTING SCHEDULE OFFERED TO THEM. I
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PAGE 02 MOSCOW 12619 01 OF 03 051123Z

REGARD THE VISIT AS SUCCESSFUL AND REWARDING. IT WAS WITH
PLEASURE THAT I LEARNED YOU HAD SPARED SOME TIME TO MEET
OUR EXPERTS AND DISCUSSED A NUMBER OF QUESTIONS CONCERNING
OUR FURTHER COOPERATION. I THINK THE EXCHANGE OF
OPINIONS WAS MOST USEFUL, ESPECIALLY IN LIGHT OF THE
FORTHCOMING 6TH MEETING OF THE COORDINATING COMMITTEE IN
SEPTEMBER - OCTOBER. IN THIS CONNECTION, I'D LIKE TO

EXPAND ON SOME QUESTIONS MENTIONED IN YOUR TALKS
WITH OUR EXPERTS.

SPEAKING ABOUT THE 50-METER MODEL OF A FLEXIBLE SUPER-
CONDUCTING CABLE BEING BUILT BY THE INSTITUTE OF CABLE
INDUSTRY (VNIKP), I'D LIKE TO UNDERLINE THAT ONLY
ADJUSTMENT TESTS OF INDIVIDUAL ELEMENTS ARE NOW
CONDUCTED: CRYOGENIC ENVELOPE, TRANSFORMER FOR INDUCTIVE
LEAD OF CURRENT AND SHORT SECTIONS OF THE CURRENT-CARRYING
CORE. THE TEST RESULTS WILL PERMIT SPECIFICATION OF THE
CABLE ASSEMBLING SCHEDULE AS WELL AS THE DEFINITION OF THE
ENTIRE PROGRAM AND TIME OF CABLE TESTING. AS AGREED AT
THE 5TH COMMITTEE MEETING IN MOSCOW, JUNE 1977 (APPENDIX
4, ITEM 3), THIS QUESTION WILL BE A SUBJECT OF DISCUSSION
AT THE 6TH COMMITTEE MEETING IN THE U.S. WHERE WE SHALL
REPORT ON THE READINESS OF THE CABLE FOR TESTS, TO
WHICH US EXPERTS WILL BE INVITED. THE PAPER TO BE
PRESENTED AT THE APPLIED SUPERCONDUCTIVITY CONFERENCE IN
PITTSBURGH BY ASSOCIATES OF VNIKP AND VEI WILL REFLECT
ONLY THE FIRST RESULTS OF ADJUSTMENT TESTS OF THE ABOVE
CABLE ELEMENTS. THE ABSTRACT OF THE PAPER FORWARDED TO
YOU SHOULD BE REGARDED IN THESE TERMS ONLY.

ENCLOSED YOU WILL FIND A TENTATIVE PROGRAM FOR THE JOINT
HEAT TRANSFER AND FLUID FLOW EXPERIMENTS. IN ADDITION
TO THESE EXPERIMENTS IN MOSCOW AND MINSK, WE ARE PLANNING
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PAGE 03 MOSCOW 12619 01 OF 03 051123Z

TO ARRANGE VISITS TO SOME OTHER INSTITUTES WHERE
STUDIES IN THIS AREA ARE UNDERWAY. SINCE YOU AND EXPERTS
WHO ARE GOING TO PARTICIPATE IN THESE EXPERIMENTS WILL
NEED SOME TIME TO CONSIDER THIS PROGRAM AND BECAUSE OF
THE SUMMER HOLIDAYS I'D SUGGEST POSTPONING THIS VISIT
TO THE USSR UNTIL EARLY SEPTEMBER SO THAT IT IS OVER
PRIOR TO THE 6TH COMMITTEE MEETING. PLEASE LET ME KNOW
WHETHER THIS DATE IS ACCEPTABLE FOR YOUR EXPERTS. I'D
APPRECIATE IF YOU FORWARDED THE PROGRAM TO MR. B.
BIRMINGHAM AND DR. V. EROSHENKO'S LETTER TO DR. M. JONES
(NBS).

AT PRESENT MEMBERS OF THE SOVIET SIDE OF THE COORDINATING
COMMITTEE ARE GETTING READY FOR THE 6TH MEETING. ACCORDING
TO OUR PREVIOUS AGREEMENT WE EXPECT THE COMMITTEE
MEETING TO TAKE PLACE AFTER THE CONFERENCE IN PITTSBURGH.
PLEASE INFORM ME WHETHER THIS COMPLIES WITH YOUR PLANS.

IT WAS GRATIFYING TO LEARN THAT YOU HAVE NEARLY
COMPLETED THE WORK ON THE JOINT PAPER ABOUT THE DEVELOP-
MENT OF US-USSR COOPERATION IN THE FIELD OF SUPER-
CONDUCTING POWER TRANSMISSION. I AM LOOKING FORWARD TO

RECEIVING THE TEXT OF THE PAPER SOON, SO I CAN
RETURN IT WITH MY REMARKS AND SUGGESTIONS, IF ANY, AS
SOON AS POSSIBLE.

THE SOVIET MEMBERS OF THE COMMITTEE AND I EXPECT TO
MEET OUR US COLLEAGUES IN SEPTEMBER-OCTOBER IN THE USA.
WE HOPE A CIRCUMSTANTIAL EXCHANGE OF OPINIONS AND
DISCUSSION OF COOPERATIVE PLANS OF INTEREST TO BOTH SIDES
WILL PERMIT MAKING OUR EXCHANGE MORE STABLE, AND THIS
WILL BE CONDUCIVE TO ADVANCING IT ON A MUTUALLY BENEFI-
CIAL BASIS.

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PAGE 01 MOSCOW 12619 02 OF 03 051132Z
ACTION EUR-12

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UNCLAS SECTION 02 OF 03 MOSCOW 12619

SINCERELY, PROFESSOR V. LEVITOV, DIRECTOR,
KRZHIZHANOVSKY POWER ENGINEERING INSTITUTE.

3. TENTATIVE SCHEDULE FOR JOINT FLUID FLOW AND HEAT
TRANSFER EXPERIMENTS (TOPICAL WORKING GROUP 3)

A. KRZHIZHANOVSKY POWER ENGINEERING INSTITUTE, MOSCOW,
2 WEEKS.

EXPERIMENTAL STUDY OF THERMOGRAVITATIONAL FORCE EFFECT
ON LOCAL AND AVERAGED HEAT TRANSFER COEFFICIENTS AS WELL
AS ON THE TEMPERATURE DISTRIBUTION IN THE FLOW AND
CHANNEL WALL.

THE STUDY IS CONDUCTED WITH HE FLOWING IN A 18-MM I.D.N
AND 3-M LONG HORIZONTAL STAINLESS STEEL CYLINDER.

PARAMETER VARIATION: PRESSURE 1.2-8 ATA, HE INLET
TEMPERATURE 5.5-10 K. HE FLOW RATE (0.5-5). 10-3 KG/S,
HEAT FLUX UP TO 55 W.

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PAGE 02 MOSCOW 12619 02 OF 03 051132Z

THE WALL TEMPERATURE IS MEASURED ALONG THE CYLINDER'S
LENGTH AND PERIMETER AND THAT OF HELIUM IS RECORDED IN
TWO CHANNEL SECTIONS. THE LOCAL AND AVERAGED HEAT
TRANSFER COEFFICIENTS ARE FOUND FROM THE OBTAINED
TEMPERATURE VALUES.

B. LYKOV HEAT AND MASS TRANSFER INSTITUTE, MINSK, 1 WEEK

(1) EXPERIMENTAL STUDY OF ELECTROTECHNICAL AND
THERMOPHYSICAL CHARACTERISTICS OF A 10-M POROUS SUPER-
CONDUCTING CABLE, INCLUDING THE DETERMINATION OF CRITICAL
CURRENT DENSITY, CAPACITANCE, INDUCTANCE, WAVE IMPEDANCE,
RESISTANCE AND REACTANCE, A.C. LOSSES, HEAT LEAKS IN
CURRENT LEAKS, COOLANT FLOW RATE, ETC.

THE ELECTROTECHNICAL AND THERMOPHYSICAL CHARACTERISTICS
ARE STUDIED ON A SHORT-CIRCUITED SINGLE-PHASE COAXIAL
CABLE IN WHICH A SUPERCONDUCTING BRAIDING AND GLASS FIBER
INSULATION ARE ALTERNATELY COATED ON A PUNCHED ALUMINUM
PIPE BACKING. AT ONE END OF THE CABLE, THE BRAIDING IS
SHORT-CIRCUITED, WHILE AT THE OTHER IT IS CONNECTED
TO FEED BUSES BY A POROUS CURRENT LEAD. THE CABLE AND THE
CURRENT LEADS ARE COOLED BY GASEOUS HELIUM SUPPLIED FROM
A DEWAR UNDER EXCESS PRESSURE. THE CABLE AND THE LEAD ARE
UNIFORMLY COOLED ACROSS THE ENTIRE THICKNESS BECAUSE OF
RADIAL FILTRATION OF SOME OF THE HELIUM FLOW THROUGH THE
POROUS WALL.

(2) EXPERIMENTAL STUDY OF THERMOPHYSICAL CHARACTERISTICS
(HEAT CONDUCTIVITY, TEMPERATURE CONDUCTIVITY, HEAT
CAPACITY) OF CONSTRUCTIONAL AND THERMAL INSULATION
MATERIALS WITHIN 4.2-300 K.

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PAGE 03 MOSCOW 12619 02 OF 03 051132Z

THE THERMOPHYSICAL PROPERTIES OF MATERIALS ARE
DETERMINED BY A COMPLEX NONSTATIONARY TECHNIQUE ON A FAC-
ILITY DEVELOPED AND MANUFACTURED AT THE INSTITUTE.
IT CONSISTS OF A HELIUM CRYOSTAT AND MEASURING SYSTEM.

THE FACILITY PERMITS TO INVESTIGATE THE TEMPERATURE
DEPENDENCE OF HEAT CAPACITY OF SUPERCONDUCTING AND
CONSTRUCTION MATERIALS USING THE ADIABATIC CALORIMETER
METHOD.

4. DEAR DR. JONES,

I AM PLEASED TO INFORM YOU ABOUT PROGRESS IN FURTHERING
THE WORK, WHICH COULD TURN INTO A POSSIBLE CONTINUATION
OF OUR JOINT EFFORT ON HEAT TRANSFER OF SUPERCRITICAL
HELIUM IN SMALL CHANNELS, THE INITIAL PART OF WHICH WAS
PUBLISHED IN "CRYOGENICS," I REFER TO THE NUMERICAL CAL-
CULATION OF HELIUM TRANSFER EQUATIONS MADE RECENTLY IN
OUR LABORATORY. THE RESULTS OBTAINED SEEM TO BE IN GENERAL
AGREEMENT WITH YOUR EXPERIMENTAL DATA, PUBLISHED IN OUR
JOINT REPORT FROM 1976. I HOPE THAT DURING OUR
FORTHCOMING VISITS BOTH TO THE USSR AND THE USA WE CAN
SPARE TIME FOR AN ANALYSIS OF THESE RESULTS. I THINK
MR. HENDRICKS WITH HIS LARGE EXPERIENCE IN SOLVING SUCH
PROBLEMS SHOULD ALSO PARTICIPATE IN OUR JOINT INVESTIGA-
TION. IN THIS CONNECTION, I HAVE MUCH INTEREST IN YOUR
OPINION ON THIS QUESTION.

WE WOULD GREATLY APPRECIATE SENDING US THE TABLES OF YOUR
EXPERIMENTAL DATA ON HEAT TRANSFER CORRES-
PONDING TO ALL TEN SECTIONS OF THE HEATED TUBE. NOW, AS
YOU REMEMBER, WE HAVE DATA FOR ONLY THREE SECTIONS. IT
DOES NOT GIVE US THE POSSIBILITY OF COMPARING THE EXPERI-
MENTAL AND CALCULATED WALL TEMPERATURE PROFILES.

DR. DANNEY SEEMS TO WANT TO KNOW THAT WE HAVE ALSO OBTAINED
CALCULATED DATA ON THE FRICTION COEFFICIENT FOR NONISOTHER-
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PAGE 04 MOSCOW 12619 02 OF 03 051132Z

MAL TURBULENT FLOW OF SUPERCRITICAL HELIUM. THESE RESULTS

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PAGE 01 MOSCOW 12619 03 OF 03 051133Z
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UNCLAS SECTION 03 OF 03 MOSCOW 12619

COULD BE COMPARED WITH NBS EXPERIMENTAL MATERIAL DURING
THE VISIT OF THE US EXPERTS TO ENIN.

WE HIGHLY APPRECIATE YOUR EFFORTS IN PREPARING OUR JOINT
PAPER DEALING WITH CURRENT LEADS. THIS IS A VERY THOROUGH
STUDY AND I MUST ACKNOWLEDGE YOUR CONTRIBUTION TO
THIS WORK. WE FULLY AGREE WITH YOUR IDEA OF SENDING THE
PAPER TO "CRYOGENICS".

WE ARE LOOKING FORWARD TO THE 1978 VISIT OF THE US
COLLEAGUES TO OUR LABORATORY.

SINCERELY YOURS, V. EROSHENKO, HEAD OF LABORATORY,
KRZHIZHANOVSKY POWER ENGINEERING INSTITUTE, MOSCOW, USSR.
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